DOE/NV/25946--076

Last-In/First-Elected/Last-Out (LIFELO) Scheme for Real-Time Sequential Analysis of Continuous Spatial Survey

Ding Yuan and Warnick Kernan
Remote Sensing Laboratory
P. O. Box 98521, M/S RSL-44
Las Vegas, NV 89193-8521
yuand@nv.doe.gov

Abstract

Conventionally, sequential analysis of time-dependent observation data follows a simple First-in/ First-out (FIFO) scheme. Under a FIFO scheme, the oldest data point in the system is first chosen for subsequent analysis, such as for computing population mean and sequential probability ratio test (SPRT). Once the analysis is completed or the decision is made, the oldest data point is dropped out of the system and a new sample is drawn. The intrinsic disadvantage of a FIFO scheme is its delayed response. At the time a new sample is drawn, the analysis either cannot tell immediately about the sample, or makes an incorrect statement about the sample.

In our research, we adopted a Last-In/ First-Elected/ Last-Out (LIFELO) scheme for real-time sequential analysis of continuous spatial survey data. In this scheme, the most recent data point from a given spatial location in the sequence is first selected for starting the subsequent analysis. If needed, the next youngest data point is chosen to join the analysis. This process is continued until a conclusion is made about the most recent location or data point. LIFELO scheme offers a reduced response time and spatial errors for decision-making for time-and-spatial critical environmental contamination surveys. In terms of methodology, it can also be used for early detection of epidemic diseases.

This work was done by National Security Technologies, LLC, under Contract No. DE-AC52-06NA25946 with the U.S. Department of Energy.

Prepared for submission to the 5th International Conference on Multiple Comparison Procedures, July 9-11, 2007, Vienna, Austria. http://www.mcp-conference.org/2007/